

2004 Northern Southeast Inside (Chatham) Sablefish Pot Survey Report

by

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and

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April 2010

Alaska Department of Fish and Game

Division of Commercial Fisheries



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Weights and measures (metric)		General		Measures (fisheries)	
centimeter	cm	Alaska Administrative		fork length	FL
deciliter	dL	Code	AAC	mid-eye-to-fork	MEF
gram	g	all commonly accepted		mid-eye-to-tail-fork	METF
hectare	ha	abbreviations	e.g., Mr., Mrs., AM, PM, etc.	standard length	SL
kilogram	kg			total length	TL
kilometer	km	all commonly accepted			
liter	L	professional titles	e.g., Dr., Ph.D., R.N., etc.	Mathematics, statistics	
meter	m			<i>all standard mathematical</i>	
milliliter	mL	at	@	<i>signs, symbols and</i>	
millimeter	mm	compass directions:		<i>abbreviations</i>	
		east	E	alternate hypothesis	H _A
Weights and measures (English)		north	N	base of natural logarithm	e
cubic feet per second	ft ³ /s	south	S	catch per unit effort	CPUE
foot	ft	west	W	coefficient of variation	CV
gallon	gal	copyright	©	common test statistics	(F, t, χ^2 , etc.)
inch	in	corporate suffixes:		confidence interval	CI
mile	mi	Company	Co.	correlation coefficient	
nautical mile	nmi	Corporation	Corp.	(multiple)	R
ounce	oz	Incorporated	Inc.	correlation coefficient	
pound	lb	Limited	Ltd.	(simple)	r
quart	qt	District of Columbia	D.C.	covariance	cov
yard	yd	et alii (and others)	et al.	degree (angular)	°
		et cetera (and so forth)	etc.	degrees of freedom	df
Time and temperature		exempli gratia		expected value	E
day	d	(for example)	e.g.	greater than	>
degrees Celsius	°C	Federal Information		greater than or equal to	≥
degrees Fahrenheit	°F	Code	FIC	harvest per unit effort	HPUE
degrees kelvin	K	id est (that is)	i.e.	less than	<
hour	h	latitude or longitude	lat. or long.	less than or equal to	≤
minute	min	monetary symbols		logarithm (natural)	ln
second	s	(U.S.)	\$, ¢	logarithm (base 10)	log
		months (tables and		logarithm (specify base)	log ₂ , etc.
Physics and chemistry		figures): first three		minute (angular)	'
all atomic symbols		letters	Jan,...,Dec	not significant	NS
alternating current	AC	registered trademark	®	null hypothesis	H ₀
ampere	A	trademark	™	percent	%
calorie	cal	United States		probability	P
direct current	DC	(adjective)	U.S.	probability of a type I error	
hertz	Hz	United States of		(rejection of the null	
horsepower	hp	America (noun)	USA	hypothesis when true)	α
hydrogen ion activity	pH	U.S.C.	United States	probability of a type II error	
(negative log of)			Code	(acceptance of the null	
parts per million	ppm	U.S. state	use two-letter	hypothesis when false)	β
parts per thousand	ppt, ‰		abbreviations	second (angular)	"
			(e.g., AK, WA)	standard deviation	SD
volts	V			standard error	SE
watts	W			variance	
				population	Var
				sample	var

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**2004 NORTHERN SOUTHEAST INSIDE (CHATHAM) SABLEFISH POT
SURVEY REPORT**

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ABSTRACT

The Alaska Department of Fish and Game (ADF&G) manages the Northern Southeast Inside (NSEI) sablefish fishery in Southeast Alaska. The survey documented in this report is part of a mark-recapture project to aid in the management of the NSEI Subdistrict commercial sablefish fishery. ADF&G uses mark-recapture data and a Petersen estimate in the NSEI sablefish fishery to estimate sablefish abundance. Using pot gear, ADF&G personnel conducted the 2004 mark-recapture survey in the 6 major commercial fishery statistical areas in Chatham Strait, between the latitudes of 56°10' N. and 58°11' N. During the 2004 survey, 7,155 sablefish were captured, and 6,357 sablefish were tagged with a passive integrated transponder (PIT) tag. The lower lobe of each fish's caudal fin was clipped prior to release. Fish were released in proportion to the 2003 commercial harvest by statistical area, and were distributed as evenly as possible within each statistical area. Other species caught incidentally included arrowtooth flounder, Dover sole, brown king crab, several species of Pacific rockfish, and halibut. Low catches of sablefish in Frederick Sound may have been due to insufficient bait in the pots.

Key words: sablefish, black cod, *Anoplopoma fimbria*, pot gear survey, Northern Southeast Inside (NSEI), PIT tag, mark-recapture, management, Chatham Strait, Southeast Alaska

INTRODUCTION

In 2004, the Alaska Department of Fish and Game (ADF&G) contracted the *F/V Ocean Cape* for 21 days, beginning June 5, to conduct the fifth in a series of sablefish (*Anoplopoma fimbria*) marking surveys using pot gear within the Northern Southeast Inside (NSEI) Subdistrict (Figure 1; Richardson 2001, 2003a, 2003b). ADF&G used mark-recapture data to calculate a Petersen estimate of abundance (Seber 1982), based on tail clips, to obtain a biomass estimate. ADF&G also used mark-recapture data to provide the most straightforward method of estimating annual exploitation rate [Based on this model, dividing the total number of tags returned from the fishery by the total number of fish tagged provided an annual exploitation rate estimate]. As with any mark-recapture study, tag-reporting rate and tag shedding rate were important components. The double marking and processing line observations allowed us to compare the number of external tags returned from the fishery to the number of tail-clipped fish detected by our observers. Counts of tail clips in excess of returned tags reflect the level of tag retention and/or reporting. However, the extent to which retention and reporting contribute to the differential is confounded. The 2 conditions affect estimates of exploitation in the same way, and result in underestimates of exploitation rate. Estimates of tag retention or reporting from ADF&G's 1997 and 1998 mark-recapture studies were 0.52 and 0.44, respectively (Carlile et al. 2002). For example, in 1997, 52% of the sablefish marked with tail clips and observed by port samplers had associated external tags recovered and returned to ADF&G by the fishing industry (fishers or processors). In 2000, based on observations of double-marked (i.e. caudal fin clip and external tags) fish in processing lines, the tag retention/reporting rate was 76% (95% confidence interval of 69.5% to 81.7%), which was higher than in previous years.

In the past ADF&G has relied on external marks (T-bar tags and tail clips) to calculate a Petersen estimate of abundance. Problems associated with use of external marks include misidentification of clipped fins, and marked fish being intentionally discarded by individuals, perhaps to alter estimates and thereby influence management decisions. In addition, in 2 previous separate incidents, processing line workers were caught cutting the tails of fish "upstream" of the point that ADF&G personnel were observing fish for tail clips.

In 2004, ADF&G used PIT tags in the NSEI sablefish marking survey. PIT tags are an injectable tag that gives no external indication the fish has been tagged, thereby eliminating the problems

associated with external tags/marks. Also, PIT tags provide a unique tag that allows ADF&G to identify individual marked fish in both the capture and recapture phases. This would allow ADF&G biologists estimate abundance by size-strata, should gear-related size selectivity recur.

OBJECTIVES

1. Mark 6,000 sablefish greater than 50 centimeters (cm) fork length (FL) with a passive integrated transponder (PIT) tag and by clipping the lower lobe of the caudal fin (Figure 2).
2. Apportion the 6,000 marked sablefish in proportion to the 2003 commercial catch by location, in Statistical Area 345603 as far south as 56°10' N latitude, throughout all of Statistical Areas 345631, 345702, 345701 and 345731, and in Statistical Area 345803 as far north as 58°11' N latitude. Distribute the marked fish as uniformly as possible, in a north to south direction, within each statistical area (Table 1).
3. Record lengths from all sablefish captured.

METHODS

The *F/V Ocean Cape*, a steel-hulled commercial fishing vessel 100 feet in length, with a 16-foot draft, was used to conduct the survey. The *F/V Ocean Cape* was built in 1997 by Bender and was originally 24 feet wide. In 1999, it was rebuilt in Seattle, using a Jensen Maritime design; the length remained the same and the vessel's width was expanded to 36 feet. A new pilothouse was added in 2001, after the existing pilothouse suffered extensive damaged during a storm.

The vessel was contracted for a 21-day vessel charter from the company, Ocean Cape LLC. Gordon Blue was the skipper. Both the skipper and the vessel were involved in the initial NSEI pot marking survey in 2000. The contractor also provided 3 crewmembers in addition to the skipper. The scientific staff consisted of 4 ADF&G staff on each of 3 legs of the survey (Table 2)

SETTING

The skipper was given free reign to fish in a manner that would maximize the catch of sablefish, within the constraints of attempting to distribute the marked fish uniformly north to south throughout each statistical area,. Except for avoiding fishing on ADF&G longline survey stations, there were no restrictions on location, depth, or soak-time. Sets were made in areas of potentially productive sablefish habitat. In 2004, most sets were made at the same or similar locations to those of the 2001 to 2003 pot surveys. When prospecting for new set locations, the vessel surveyed the area and checked bottom bathymetry prior to setting gear.

The general goal was to capture, double mark and release sablefish, and to distribute them geographically in proportion to the 2003 commercial fishery. To achieve this goal, the following protocol was adopted:

1. Continue to mark fish on a set even when the marking goal for that statistical area had been exceeded on that set.
2. Release all unmarked fish from any additional sets that were still in the water after goals for that statistical area had been achieved.
3. Do not make additional sets in a statistical area if within 50 fish of that area's goal.

4. If catch rates are very low in a given area, discontinue that area after achieving 80% of the goal; make up the additional fish in another statistical area.

The purpose of apportioning the marked fish among the statistical areas was to distribute the marked fish approximately in proportion to the commercial fishery catch distribution in 2003. This apportionment was intended to fulfill inherent catchability assumptions in mark-recapture studies

The daily routine was to work 2 sets of pots: haul one string of pots and set those pots in a different location; haul the second set and set those pots in a different location; then, let both sets soak overnight. From the confluence of Peril Strait with Chatham Strait going north, ADF&G personnel made sets on historically most productive locations. When heading back southward, the crew sampled the remaining areas where necessary to reach marking goals. The crew continued setting the best available sets traveling southward. Upon reaching the confluence of Frederick Sound and Chatham Strait, the *F/V Ocean Cape* moved into Frederick Sound and the crew began making pot sets. After sampling in Frederick Sound, the *F/V Ocean Cape* traveled to Petersburg for additional bait, and proceeded to the southern end of Chatham Strait, where the crew made pot sets northward in Chatham Straits, to the confluence of Frederick Sound and Chatham Strait. Then, the crew put all gear onboard the boat and traveled to the confluence with Peril Strait, to make the final 2 sets to sample in the areas. The survey then ended in Sitka the following morning.

For each set, the beginning and ending latitude and longitude, anchor times, number of pots per set, and depths where each pot went overboard was recorded by ADF&G staff. To facilitate tagging and releasing fish quickly, the catches were enumerated per set and not by pot. The distribution of the location of the sets between and among statistical areas is shown on the chart in Figure 3.

GEAR

The vessel provided the sablefish pots and the other gear necessary to longline the pots. The pots were 5-foot cone sablefish pots purchased from last years contractor so were similar in design to what was used previously. The design of the webbing tunnel configuration varied from pot to pot, most or all of the pots were equipped with 2 opposing tunnels.

A string of gear consisted of floating line with two 18" hard buoys followed by 2 large plastic buoy bags, 50 fathoms (fm) of line, a sash weight, a buoy line equal to about 350 fm depending on set depth, a surge weight, 50 fm of line, and an anchor. The groundline was configured with 40 beackets spaced at 50 fm intervals (Figures 4 and 5). The end of the ground line consisted of a second anchor and the reversal of the gear. In 2004, the number of pots per string varied from 34 to 42. Pots were placed onto the string at 50 fm intervals. The maximum number of pots per string was normally 40. However, when setting in shallow waters, additional pots were added to the string to increase the catch in areas of suspected low catches. Regardless of the number of pots on the set, a string of groundline per set covered roughly 3.54 km (2.2 miles).

Two strings of groundline, running line, and buoy line were stored in a line alley along the aft section of the starboard side of the vessel (Figure 6). The crew made efforts to always have a string of pots in the water. This eliminated time and effort, as the pots did not need to be broken down and stacked so tightly. Both strings of pots were stacked onboard when moving substantial distances.

BAIT

The contractor provided bait, which by request consisted of hake and squid for the first 9 days. A portion of the squid was ground and put into bait bags; the remainder of the bait hung on bait hooks. Approximately 1.89 kg (4 lbs.) of hake and 0.94 kg. (2 lbs.) of squid were used per pot. A standardized amount of bait was to be used in each pot throughout the survey to reduce variables, however bait use varied considerably throughout the survey. Bait use was increased after relatively poor catches in the first few sets. This increased bait use resulted in both increased catches and running short of bait. Sets made in Frederick Sound just prior to going to town were made with limited amounts of bait. The contractor purchased additional bait in Petersburg. However, no hake was available. Herring and squid made up the bait combination for the remainder of the survey, with the bait jars being heavily loaded (Figure 7).

SABLEFISH MARKING

The PIT tag marking station consisted of the following: a semi-automated computerized data-entry system; a shelter to keep computer components dry; and a measuring/tagging cradle (Figure 8). The station consisted of a PIT tag transceiver (reader/wand) connected to a Personal Data Assistant (PDA) computer running specialized data collection software. The computerized data entry system allowed the sampling crew to record tag number and sablefish length directly into the database, thereby reducing keying error. As each fish was processed on deck and tagged, the PIT code was scanned into the PDA.

Pots were brought aboard one at a time during the set; any sablefish in the pot were placed in one of 3 large totes containing seawater (Figures 9 and 10). Sablefish were carried individually to the tagging station where they were laid in a tagging trough. Sablefish were measured for length and inspected for wounds caused by sand fleas or pot damage (frayed fins). If the fish was wounded the fish was not tagged. Instead, it was measured and released. All healthy sablefish greater than 50 cm fork length were measured to the nearest centimeter, and injected with a preloaded TX 1440ST Sterile Syringe & needle (12 gauge, with 1.25" needle), which inserted a 11.5 mm glass encapsulated PIT tag [134.2 kHz ISO (FDX-B technology) with bio-bond sleeve to reduce tag migration] (Figure 11). The PIT tag was implanted in the left cheek approximately 1 inch forward of the top of the preoperculum. The needle was inserted just under the skin approximately 1.25 cm. (1/2 inch) deep before the tag was injected (Figure 12). The lower lobe of the caudal fin was then clipped. The tag number was then read using an ALLFEX® stick reader and stored into a PDA device. The fish was then immediately released. Any fish, whose tag did not read, was retained. The condition of the fish and other relevant observations were noted.

Once implanted, the tag can remain functional in the fish for years. The tag is encoded with country and region code of origin, as well as 12-digit serial number that allow unique identification of each fish.

Sablefish 50 cm and smaller were released without marking. These smaller fish were not marked, due to concerns about inconsistent retention of small fish during the commercial fishery.

PREVIOUSLY TAGGED SABLEFISH

Sablefish captured during the 2004 survey that had been previously marked by ADF&G, either on this survey or in previous years, were not retagged. Sablefish that had been tagged in previous years and captured this year were measured, the tag number was recorded, the set location was

noted, and the fish were then re-released with the original tag in place. Sablefish that had been tagged on this year's survey had their PIT tag reread. The set location was noted and the fish were quickly released.

BIOLOGICAL SAMPLING

Fork lengths, to the nearest whole centimeter (cm), were taken on all sablefish captured. No other biological samples were taken.

BYCATCH

The bycatch of groundfish was identified and enumerated by species and this information was recorded for each set.

DATA MANAGEMENT

On deck, the sampling crew captured data onto a DELL® Axim X5 Pocket PC, which was connected through a custom manufactured serial data cable to an Allflex® ISO RFID RS250-45 stick reader (Figure 13). Data entry was made possible by an entry program provided by the International Pacific Halibut Commission (IPHC) and modified by in-house programmers. This program wrote, the data, to a Pocket Access Database.

This semi-automated system allowed samplers to enter length, and release condition onto the PDA while still allowing for automated streaming of the tag number once the stick reader was activated. Once a set was complete, it was backed up while on deck to a compact flash card. After this backup, the Pocket Access Database was further backed up to a laptop, to prevent any possible data loss.

RESULTS

SETTING

The sampling crew made 28 pot sets, consisting of 1,076 individual pots being set and retrieved (Table 3). A total of 7,155 sablefish were captured. Catches were enumerated per set and not by individual pot. Therefore, catch data per individual pot is not available. The average number of sablefish captured per pot within a set ranged from 0.4 to 13.6, with the survey's average being 6.6 sablefish per pot. The minimum and maximum depths recorded for the ends of the sets were 182 and 455 fathoms respectively. The mean depth per set (the average depth of each pot on a string) was 326 fathoms. Soak time was measured from the first anchor overboard to the first anchor onboard, and ranged from 7 hours 20 minutes to 26 hours 22 minutes. The average soak time for a set was approximately 18 hours.

The sampling crew left no pot sets in the water this year while traveling to Petersburg mid-survey. While leaving pots in the water when traveling to town may have been done in previous years, the sampling crew chose not to, due to the logistics of the 2004 survey.

SABLEFISH MARKING

Of the 7,155 sablefish captured during the survey, 57 sablefish were determined to be in questionable condition, and were therefore not marked prior to release; 381 fish measured 50 cm or less and therefore were released unmarked; 181 were released healthy without a 2004 tag or tail clip as they already had a tag (4 of these already had a PIT tag. The remainder had previous year's ADFG T-bar tags. All 179 sablefish on set 8 were discarded as we had reached our goal

for that statistical area, before the set was retrieved. The remaining 6,357 sablefish were marked and released (Table 4).

Marking goals were met and exceeded in 4 of the 6 statistical areas (Table 4). The only area where the sampling goal was not attained was 345702 (Frederick Sound); less than 100 fish in 3 potentially productive sets were captured. Additional sets were not made in this statistical area; we felt that our time was better spent in areas that were more productive. Only after the survey was completed did we become aware that the limited amount of bait in these sets might have lead to the poor catches.

PREVIOUSLY TAGGED SABLEFISH

A total of 181 sablefish previously tagged by ADF&G were captured in the pots. These previously tagged sablefish were all originally released in NSEI, and consisted of 2 from the 1998 release, 2 from the 2000 release, 26 from the 2001 release, 41 from the 2002 release, 106 from the 2003 release and 4 PIT tags recovered from the 2004 release (Table 5). All these previously tagged sablefish were re-released with the initial tag in place, and with no additional marking. Thirteen sablefish tagged in previous years were captured and released for the third time, and 4 were captured and re-released for the fourth time, all with their original tag in place. Several previously tagged fish had lost their tags in the pots on their way to the surface, as evidenced by recent bloody tag wounds.

No other agency's tags were recovered.

BIOLOGICAL SAMPLING

The sampling crew recorded fork lengths for 6,963 fish. The sablefish ranged in length from 42 cm to 97 cm. The mean length was 61 cm and a mode was noted around 60 cm (Figure 14).

No other biological samples were taken.

BYCATCH

The primary bycatch consisted of 516 arrowtooth flounder (*Atheresthes stomias*) and 261 Dover sole (*Microstomus pacificus*). In addition, 70 Pacific halibut (*Hippoglossus stenolempis*), 30 rougheye rockfish (*Sebastes aleutianus*), 25 shortspine thornyhead (*Sebastolobus alascanus*), 6 Pacific sleeper sharks (*Somniosus pacificus*), 3 redbanded rockfish (*Sebastes babcocki*), and 2 grenadier (*Coryphaenoides acrolepis*) were also captured as bycatch, as well as 85 brown king crab (*Lithodes aequispina*) and 2 bairdi tanner crab (*Chionoecetes bairdi*) were landed from the pots (Table 6).

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Table 1.—Target tagging goals of number of fish to mark by statistical area, NSEI pot survey, 2004.

Statistical Area	2003 Catch	Proportion	Tagging Goals				
			5,000	6,000	7,000	8,000	9,000
345603	176,477	9.0%	450	540	630	720	810
345631	617,655	31.5%	1,576	1,891	2,206	2,521	2,836
345701	669,496	34.2%	1,708	2,050	2,391	2,733	3,074
345702	108,649	5.5%	277	333	388	444	499
345731	212,421	10.8%	542	650	759	867	975
345803	175,146	8.9%	447	536	626	715	804
Total	1,959,843	100.0%	5,000	6,000	7,000	8,000	9,000

Table 2.—Survey crew, NSEI pot survey, 2004.

Vessel Crew	ADF&G Staff, Leg 1	ADF&G Staff, Leg 2	ADF&G Staff, Leg 3
Gordon Blue (skipper)	Tory O'Connell	Sherri Dressel	Cleo Brylinsky
John Jorgenson (deck boss)	Mike Vaughn	Kamala Carroll	Deidra Holum
Don Bolz (engineer)	Beverly Richardson	Beverly Richardson	Beverly Richardson
Jeremy Sanbeck (cook)	Eric Coonradt	Eric Coonradt	Eric Coonradt

Table 3.—Set summary, NSEI pot survey, 2004.

Set	Statistical Area	Start Latitude	Start Longitude	End Latitude	End Longitude	Date and Time of 2nd Anchor Over	Soak Time between 2nd Anchor Over to 1st Anchor Onboard	No. Pots Retrieved	Avg Depth	No. Sablefish Captured	Average No. Sablefish per Pot	No. Sablefish PIT Tagged
1	345701	57 27.60	134 40.70	57 26.24	134 43.43	6/6/04 8:06	22hr 09min	35	303	294	8.4	261
2	345731	57 36.05	134 46.01	57 36.50	134 49.44	6/6/04 16:10	24hr 00min	35	320	111	3.2	104
3	345731	57 48.79	134 50.57	57 47.25	134 52.84	6/7/04 14:50	16hr 39min	36	291	168	4.7	165
4	345803	58 1.98	134 52.61	58 0.32	134 51.31	6/7/04 21:43	14hr 45min	34	371	138	4.1	135
5	345803	58 3.59	134 59.98	58 1.70	134 54.52	6/8/04 12:05	7hr 20min	38	318	161	4.2	159
6	345803	58 7.20	134 55.92	58 5.08	134 55.92	6/8/04 22:48	8hr 42min	42	354	207	4.9	207
7	345731	57 52.39	134 46.17	57 53.94	134 46.33	6/8/04 16:46	21hr 02min	38	268	492	12.9	464
8	345731	57 42.20	134 45.82	57 43.80	134 45.66	6/9/04 12:30	18hr 54min	42	270	179	4.3	0
9	345701	57 25.14	134 46.40	57 23.52	134 41.97	6/9/04 20:20	17hr 38min	38	312	290	7.6	270
10	345701	57 16.10	134 41.66	57 14.72	134 44.15	6/10/04 12:27	20hr 33min	38	461	164	4.3	155
11	345701	57 11.20	134 46.03	57 9.85	134 44.01	6/10/04 18:30	19hr 40min	36	336	490	13.6	430
12	345701	57 5.00	134 40.36	57 2.95	134 39.73	6/11/04 13:08	18hr 54min	40	325	371	9.3	344
13	345701	57 1.85	134 44.25	57 3.41	134 45.03	6/11/04 18:13	19hr 22min	38	344	215	5.7	205
14	345701	57 9.73	134 44.89	57 7.77	134 45.05	6/12/04 12:30	19hr 04min	42	337	251	6.0	218
15	345631	56 56.99	134 41.73	56 58.56	134 40.27	6/12/04 17:42	22hr 48min	38	338	463	12.2	430
16	345631	56 55.45	134 38.14	56 54.51	134 35.56	6/13/04 12:05	19hr 35min	40	355	281	7.0	262
17	345631	56 47.74	134 37.21	56 47.77	134 34.25	6/13/04 21:51	14hr 37min	34	395	319	9.4	257
18	345631	56 52.38	134 37.01	56 53.07	134 33.76	6/14/04 11:06	22hr 09min	40	368	473	11.8	426
19	345702	56 59.93	134 9.94	56 59.26	134 12.60	6/14/04 17:45	22hr 50min	41	214	55	1.3	54
20	345702	56 58.52	134 17.78	56 59.39	134 21.67	6/15/04 15:22	22hr 48min	40	189	15	0.4	15
21	345702	57 5.23	134 10.45	57 3.84	134 12.52	6/15/04 19:27	21hr 38min	42	196	28	0.7	28
22	345603	56 28.49	134 36.43	56 26.52	134 35.39	6/18/04 2:56	12hr 48min	39	322	281	7.2	255
23	345603	56 12.75	134 27.83	56 10.85	134 27.18	6/18/04 5:22	26hr 22min	40	360	456	11.4	423
24	345631	56 32.85	134 32.50	56 31.06	134 31.93	6/18/04 19:25	19hr 47min	38	338	150	3.9	141
25	345631	56 38.94	134 35.20	56 37.38	134 33.57	6/19/04 14:32	17hr 37min	40	353	466	11.7	377
26	345631	56 42.51	134 33.78	56 41.23	134 35.85	6/19/04 19:11	17hr 14min	36	376	371	10.3	312
27	345701	57 18.16	134 42.85	57 16.80	134 41.56	6/20/04 20:05	20hr 04min	36	362	197	5.5	192
28	345701	57 21.60	134 41.80	57 19.95	134 40.34	6/20/04 21:34	15hr 22min	40	353	69	1.7	68
Total								1,076		7,155	6.6	6,357

Table 4.—Number of sablefish released by statistical area and proportion of objective marked by statistical area, NSEI pot survey, 2004.

Stat Area	Discarded Due to Fleas	Discarded, Healthy	Discarded, too Small	Released; Already Tagged	Tagged, then Released	6,000 Tagging Goal	Percent of 6,000 Fish Objective Marked
345603	5	—	32	22	678	540	125.6%
345631	7	—	220	91	2205	1,891	116.6%
345701	34	—	106	58	2143	2,050	104.5%
345702	—	—	—	1	97	333	29.1%
345731	10	179	20	8	733	650	112.8%
345803	1	—	3	1	501	536	93.5%
Grand Total	57	179	381	181	6,357	6,000	106.0%

Table 5.—Tag recovery event for sablefish previously tagged sablefish in the NSEI pot survey, 2004.

Original Release Year of Tag Recovery	Recovery Tag Event			
	Second Release	Third Release	Fourth Release	Total
1998	1	1	—	2
2000	1	1	—	2
2001	18	4	4	26
2002	34	7	—	41
2003	106	—	—	106
2004	4	—	—	4
Total	164	13	4	181

Table 6.—Bycatch in numbers of fish, by set, in the NSEI pot survey, 2004.

Set	Sablefish	Arrowtooth Flounder	Dover sole	Rockfish			Halibut	Grenadier	Pacific Sleeper Shark	Brown King Crab	Bairdi Tanner crab.
				Shortspine Thornyhead	Rougeye	Redbanded					
1	294	8	1	1	—	—	1	—	1	—	—
2	111	6	4	—	—	—	—	—	—	—	—
3	168	7	1	1	—	—	2	—	1	—	—
4	138	—	—	—	—	—	—	—	—	—	—
5	161	13	—	1	—	—	2	—	1	2	—
6	207	15	7	—	—	—	1	—	—	—	—
7	492	10	—	—	1	—	3	—	—	—	—
8	179	7	7	—	—	—	1	—	1	—	—
9	290	5	4	—	—	—	—	—	—	—	—
10	164	5	16	1	—	—	—	—	—	—	—
11	490	7	8	1	—	—	1	—	—	—	—
12	371	10	—	1	—	—	2	—	—	32	—
13	215	3	21	3	—	—	—	—	—	2	1
14	251	9	7	1	—	—	1	—	1	—	—
15	463	20	6	1	—	—	1	—	—	—	—
16	281	30	39	2	—	—	1	—	—	—	—
17	319	16	27	—	—	—	—	—	—	—	1
18	473	16	37	4	—	—	3	—	—	—	—
19	55	123	3	—	18	—	17	—	1	—	—
20	15	55	—	—	9	1	11	—	—	7	—
21	28	61	3	—	2	2	8	—	—	40	—
22	281	20	2	1	—	—	4	—	—	—	—
23	456	36	9	1	—	—	2	2	—	—	—
24	150	4	8	2	—	—	5	—	—	—	—
25	466	19	12	1	—	—	1	—	—	2	—
26	371	7	10	1	—	—	3	—	—	—	—
27	197	2	23	—	—	—	—	—	—	—	—
28	69	2	6	2	—	—	—	—	—	—	—
	7,155	516	261	25	30	3	70	2	6	85	2

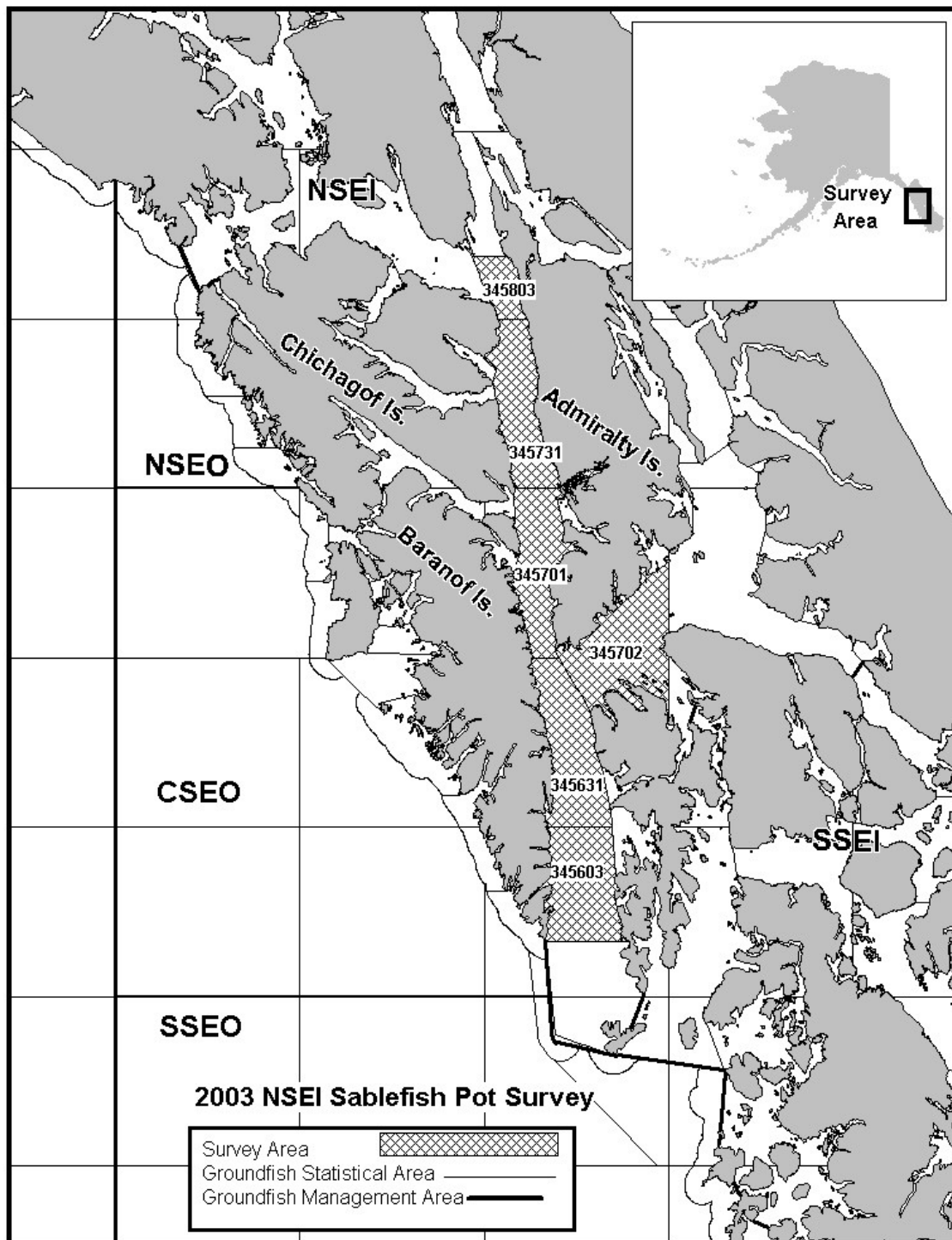


Figure 1.—NSEI Sablefish pot survey, 2004



Figure 2.—Injecting PIT tag and clipping fin on a sablefish, NSEI pot survey, 2004.

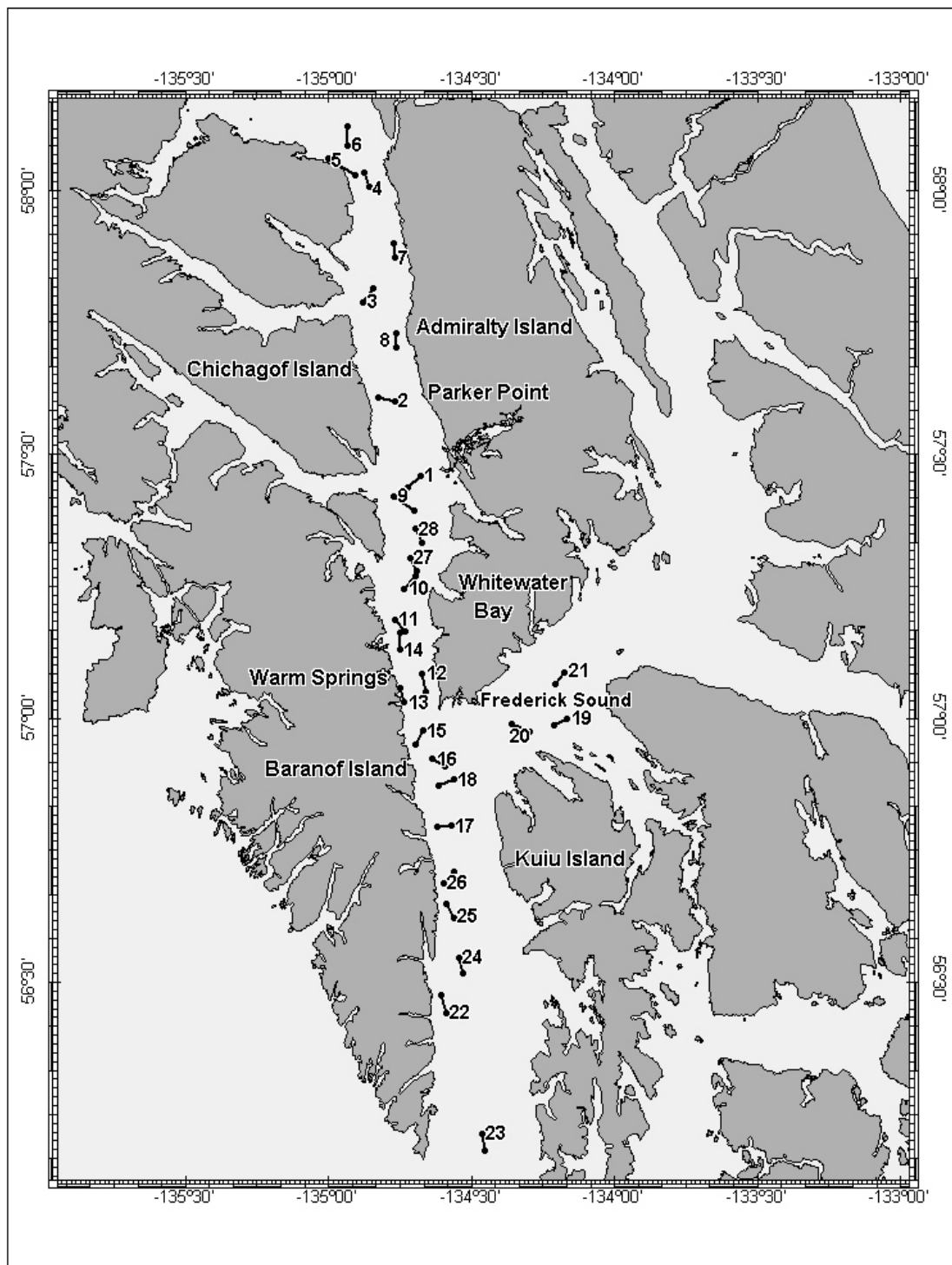


Figure 3. –Set locations and set numbers, NSEI pot survey, 2004.



Figure 4.—Pots used in 2004 survey.



Figure 5.—Buoy setup consisted of 2 hard buoys followed by one soft plastic buoy bag.



Figure 6.—Line was stored in a line alley along the starboard side of the vessel.



Figure 7.—Bait bags and hanging bait, NSEI pot survey 2004.



Figure 8.—PIT tag marking station for the NSEI pot gear survey, 2004.



Figure 9.—Dumping a pot into the hopper, NSEI pot survey, 2004.



Figure 10.—Sablefish in hopper, NSEI pot survey, 2004.

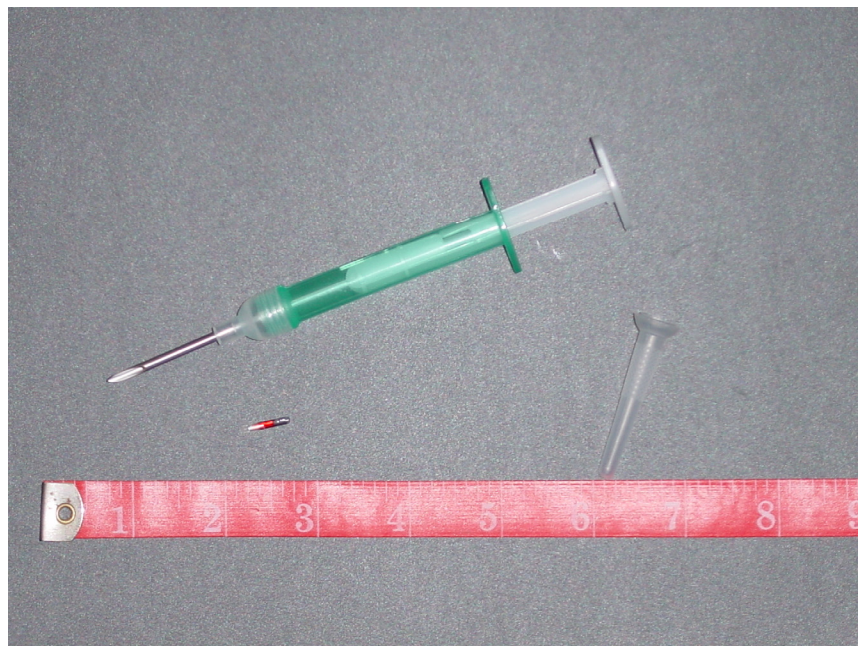


Figure 11.—Sterile syringe and needle with an 11.5 mm glass encapsulated PIT tag.

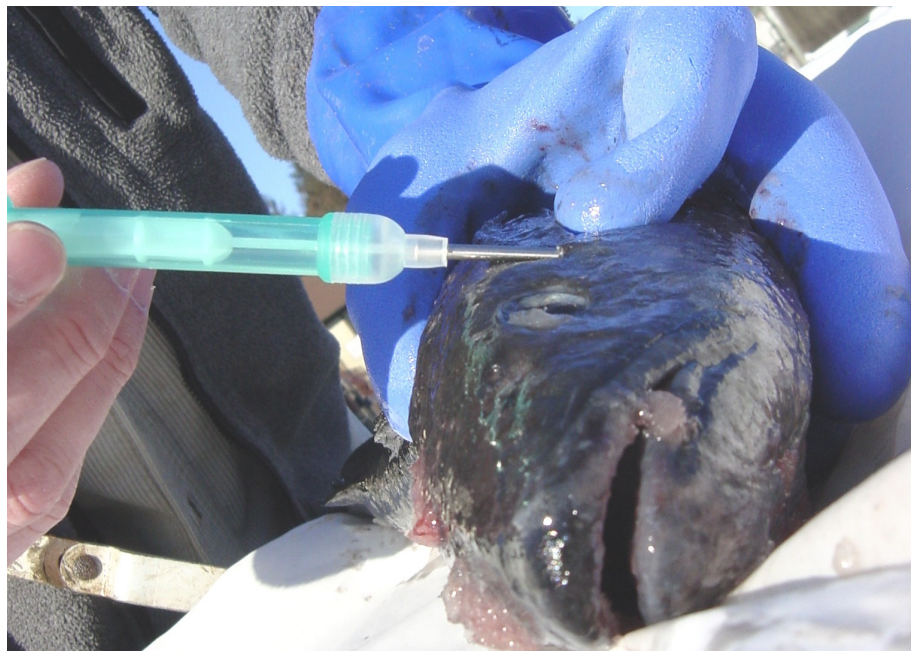


Figure 12.—PIT tag insertion technique for the 2004 pot gear survey.

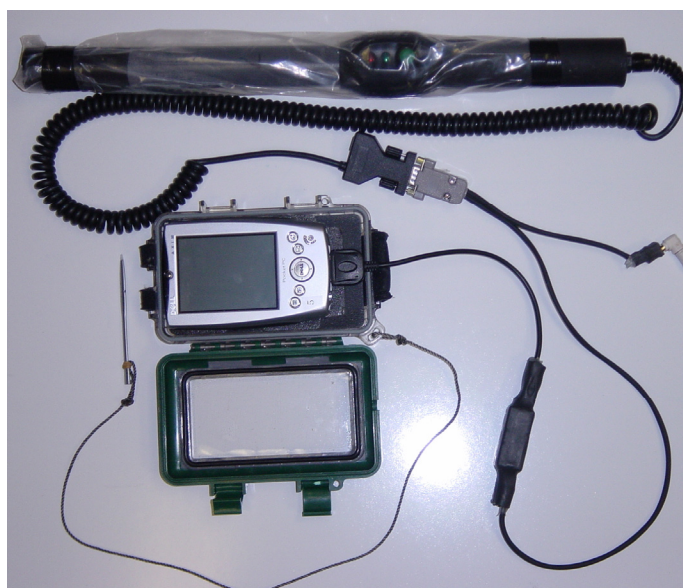


Figure 13.—DELL Axim X5 Pocket PC connected through a custom manufactured serial data cable, to an Allflex ISO RFID RS250-45 stick reader.

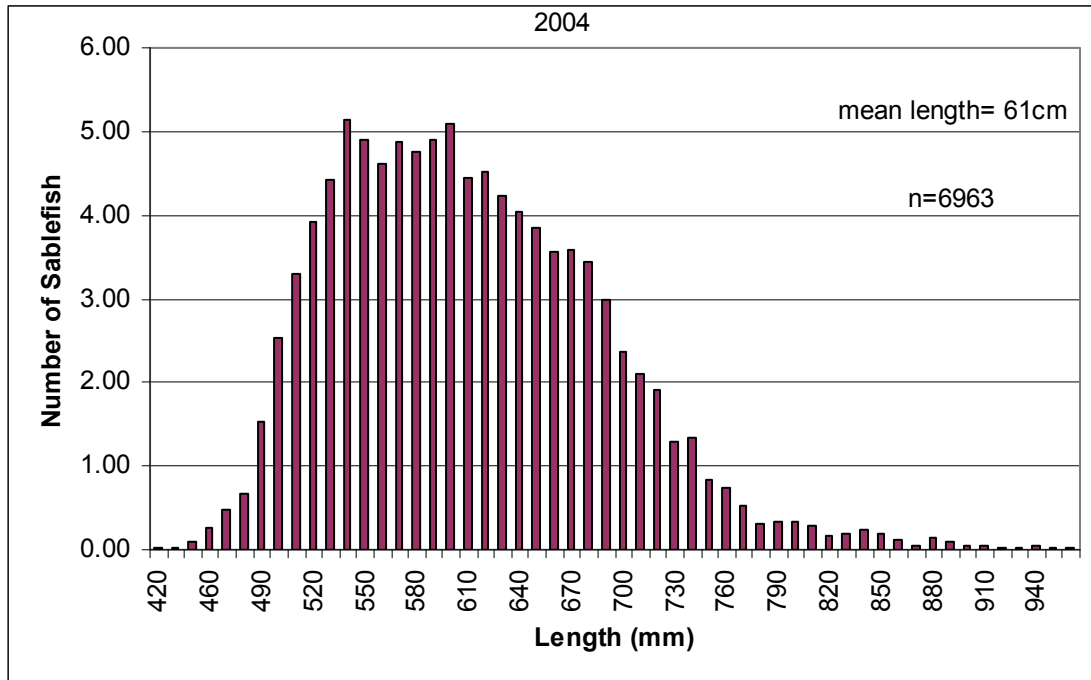


Figure 14.—Length frequency of sablefish caught during the 2004 pot gear survey.